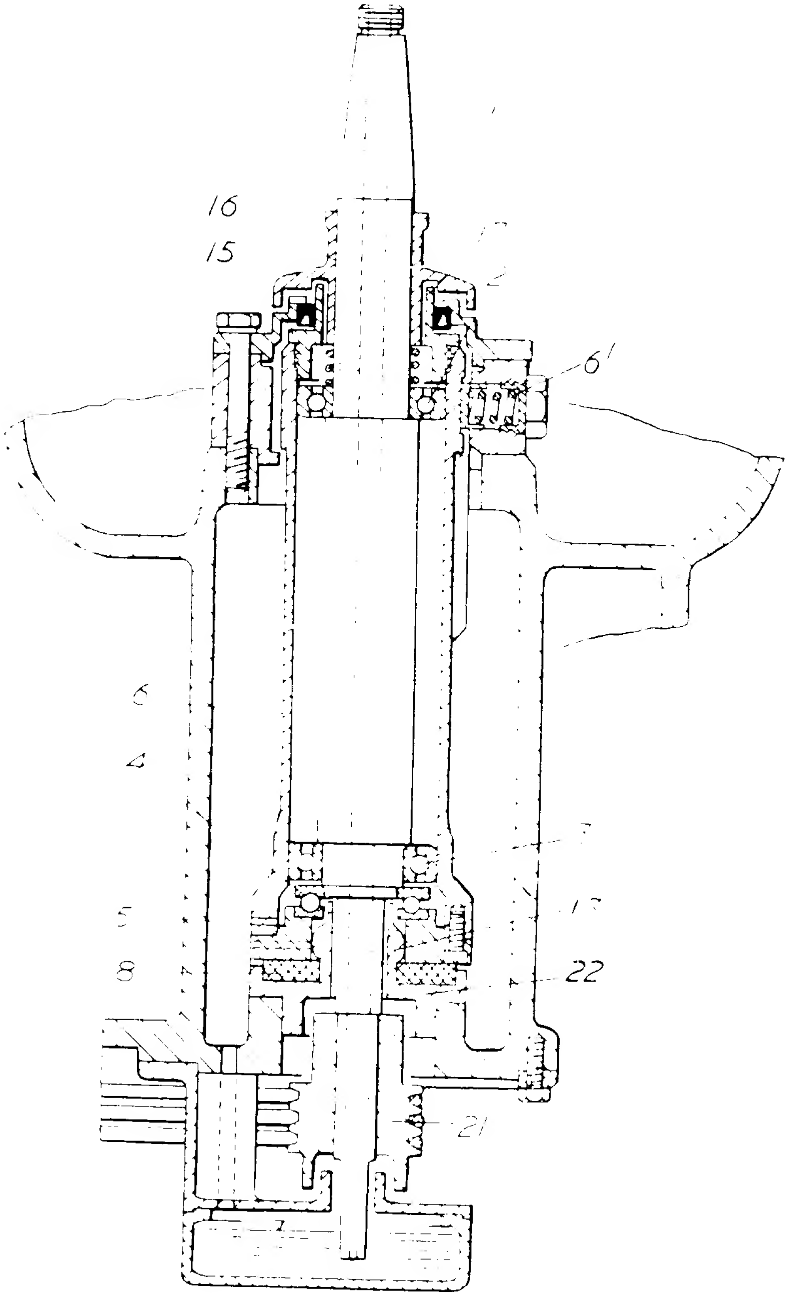
954144
2 SHEETS

COMPLETE SPECIFICATION
This drawing is a reproduction of
the Original on a reduced scale
Sheets 1 & 2

Fig. 3



PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in and relating to Spindle Mountings

We, WESTFALIA SEPARATOR AG., a German Company, of Oelde, Westfalen, Germany, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to centrifuges.

The vertical spindle of a centrifuge is normally mounted for rotation in upper and lower radial bearings. Apart from the seating of the rotating spindle, the upper bearing also has the task of opposing radial vibrations, which occur due to want of balance of the drum. This is achieved for example by arranging for the thrust ring surrounding the outer bearing bush to co-operate with a spring system arranged in star form and secured to the centrifuge frame. Due to the resilient supporting of the upper bearing the spindle normally still carries out slight rocking movements. When the lower bearing is clamped firmly in the separator frame, this bearing must not behave rigidly in relation to the vibrations of the spindle. [illegible] the distance between the upper and lower radial bearings, the smaller are the rocking movements of the spindle in the region of the lower bearing.

In order to be able to take up the rocking movements of the spindle, the lower radial bearing arranged at its extreme end is generally constructed as a swing bearing. The inner bearing bush is mounted fast on the spindle. Its outer bearing surface is provided with two concentric channels in which balls arranged in two rows, one above the other, [illegible]. The [illegible] defined position in relation to the spindle. [illegible] held by the [illegible] of the balls [illegible] bearing surface of the outer bearing bush when the spindle rocks about its vertical position.

[Price 3s. [illegible]]

In the case of larger centrifuges a step or thrust bearing is generally arranged beneath the spindle so as to take up the weight of the drum and of the spindle. It rests on a thrust member which can be provided on the underside with a central bore for the reception of a compression spring in order to compensate for axial vibrations of the spindle. By screwing a threaded member into the thrust bearing housing, the thrust bearing, thrust member and compression spring are held together and pressed against the lower end of the spindle. In this manner the spindle can also be displaced axially with the drum mounted thereon, which is of considerable importance when the centrifuged material is removed by means of skimming plates for the precise setting of the drum.

However, this construction, although often employed, has certain disadvantages. Firstly it is a disadvantage that the rocking movements of the spindle at the lower end have to be taken up by movable parts [illegible] are thereby subjected to increased [illegible]. In the course of time this can lead to damage to the bearing bushes and the thrust bearing housing. In order to replace a damaged thrust bearing housing the latter [illegible] to be knocked out of its [illegible]. Since centrifuges are normally [illegible] mounted, it is then necessary to remove the centrifuge from its bed. This is [illegible] complicated and causes difficulties especially when there is a lack of space for [illegible] on ships. Furthermore the [illegible] and [illegible] conduits have to be unscrewed and on the subsequent assembly a fresh setting of the spindle to the correct height is necessary.

The present invention makes it possible [illegible] and [illegible] the centrifuge comprises a [illegible] arranged around the vertical spindle of the centrifuge said sleeve carrying upper and lower radial bearings for the spindle and a thrust bearing for supporting the lower portion of the spindle, and a resilient support member upon which the lower end of the sleeve rests so as to be capable of rocking movement with respect to a locating member, said resilient support member and said locating member being carried by the frame of the centrifuge, whereby the sleeve can rock with the spindle.

The assembly of the sleeve and the bearings carried thereby can be erected outside the centrifuge. The swing bearing is replaced by an ordinary radial bearing, and the thrust bearing can be held by a bushing screwed to the sleeve. When the drum lacks balance now the spindle no longer rocks alone, but the assembled spindle and sleeve can rock about a bolt rigidly secured on the frame or in a ring rigidly secured on the frame. The spindle and the entire mounting is supported on the resilient support member which takes up both rocking movements and axial vibrations. Thus a separate compression spring is not required.

Due to this arrangement the compensation of the rocking movements is transmitted from rotating parts to non-rotating. Damage to the bearings due to rocking movements are thus avoided from the outset. The assembled mounting can be taken out of the centrifuge frame, after the drum has been lifted off and a few screws released. A fresh adjustment of the spindle level after reassembly is no longer necessary. Due to the fact that the sleeve rocks with the spindle, the air gap between the upper radial bearing spindle cap and a guide ring screwed into the sleeve can be very small so that the penetration of harmful gases and vapours is largely prevented. In the case of damage to the upper radial bearing, this guide ring can serve for a short time as a plain bearing and thereby prevent greater damage.

In order that the invention may be more fully and clearly understood, several embodiments will now be described with reference to the accompanying drawings, in which Figs. 1, 2 and 3 are similar sectional elevations of three different spindle mountings for centrifuges, all constructed in accordance with the invention.

Referring first to Fig. 1, spindle 1 is rotatably carried in the upper radial bearing 2 and lower radial bearing 3. Step or thrust bearing 4 supports the spindle and drum in the axial direction. It rests on a thrust member 5 which is pressed by a bushing 7 screwed into a sleeve 6 against the step bearing. A support member 8 of resilient material takes up the axial vibrations and the rocking movements of the spindle. It is disposed about a pin 9 of a cover member 10, which is secured by means of screws 11 to the centrifuge frame 12. Above the support member 8 there is arranged about the pin 9 a rocking ring 13. Ring 13 can consist of metal or of another material, for example synthetic plastic. The bearing 3 is covered by a ring 14.

The upper end of the sleeve 6 is resiliently mounted in the centrifuge by means of a mounting of a plurality of angularly spaced radial springs 6.

Into the upper end of the sleeve 6 there is screwed a guide ring 15 between which and the upper bearing spindle cap 16 there is a narrow annular gap 17. The sleeve 6 is provided with an aperture 18 to permit the spindle to be driven by a worm 19 engaging a pinion 20 fast on the spindle. In order to be able to avoid the worm when the sleeve is being taken out, the bottom of the centrifuge frame is so constructed on the side opposite to the worm that the sleeve can be pivoted out.

The construction shown in Fig. 2 is generally similar to that of Fig. 1 and the same references have been used for corresponding parts. In the case of Fig. 2 however, the lower end of sleeve 6 is disposed within the rocking ring 13 which is secured directly to the centrifuge frame 12.

Fig. 3 shows another arrangement constructed in accordance with the invention. Here the drive spindle 1 protrudes through the support member 8 and a V-belt pulley 21 is attached to the protruding end of the spindle. The rocking ring 13 is formed integrally with member 22. In place of the V-belt pulley 21 it is also possible for a drive wheel to be arranged on the protruding spindle end.

WHAT WE CLAIM IS:—

1. A centrifuge which comprises a sleeve arranged around the vertical spindle of the centrifuge, said sleeve carrying upper and lower radial bearings for the spindle and a thrust bearing for supporting the lower portion of the spindle, and a resilient support member upon which the lower end of the sleeve rests so as to be capable of rocking movement with respect to a locating member, said resilient support member and said locating member being carried by the frame of the centrifuge, whereby the sleeve can rock with the spindle.

2. Centrifuge in accordance with Claim 1 in which the locating member is arranged within the lower end of the sleeve.

3. Centrifuge in accordance with Claim 2 in which the locating member is in the form of a ring carried by a pin rigidly secured to the frame of the centrifuge or other apparatus.

4. Centrifuge in accordance with Claim 1 in which the locating member is in the form of a ring into which the lower end of the sleeve extends, said ring being rigidly se-

cated to the frame of the centrifuge.

5. Centrifuge in accordance with any one of Claims 1 to 4 in which the spindle carries a gear wheel intermediate the upper and lower bearing means, the sleeve being apertured so as to permit said gear wheel to mesh with another gear wheel.

6. Centrifuge in accordance with Claim 5 in which said gear wheel is a pinion and said other gear wheel is a worm for driving the spindle.

7. Centrifuge in accordance with any one of Claims 1 to 5 in which the spindle protrudes beyond the lower end of the sleeve and through the resilient supporting means.

8. Centrifuge in accordance with Claim 7 in which the protruding end of the spindle carries means for taking up a drive to the spindle.

9. Centrifuge in accordance with Claim 8 in which the protruding end of the spindle carries a belt pulley.

10. Centrifuge constructed and arranged to operate substantially as herein described with reference to Figs. 1, 2 or 3 of the accompanying drawings.

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